

COPYRIGHT NOTICE



FedUni ResearchOnline
<http://researchonline.ballarat.edu.au>

This is the submitted for peer-review version of the following article:

Newton, J., White, P., Ewing, M., Makedissi, M., Davis, G., Donaldson, Sullivan, J., A., Seward, H., & Finch, C. (2013). Intention to use sport concussion guidelines among community-level coaches and sports trainers. *Journal of Science and Medicine in Sport*.

Which has been published in final form at:
<http://dx.doi.org/10.1016/j.jsams.2013.10.240>

© 2013 Elsevier Ltd.

This is the author's version of the work. It is posted here with permission of the publisher for your personal use. No further distribution is permitted.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21

Title

Intention to use sport concussion guidelines among community-level coaches and sports
trainers

Authors

Joshua Newton¹, Peta E White², Michael T. Ewing¹, Caroline F Finch²

Author Affiliations:

¹Department of Marketing, Peninsula Campus, Monash University, Frankston, Victoria,
Australia

²Centre for Healthy and Safe Sport, University of Ballarat, Ballarat, Victoria, Australia

Keywords: football, sports injuries, decision making, self-efficacy, head injury, injury
prevention

Word count (excluding abstract, references, and tables): 2,555

Word count (abstract): 248

Number of in-text tables: 2

Number of in-text figures: 1

Abstract

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Objectives: Sporting bodies have developed guidelines for managing community-level players with suspected concussion in response to international consensus statements on concussion in sport. The purpose of this study was to examine the factors that influence the intended use of concussion guidelines among community-level coaches and sports trainers from two football codes in Australia: Australian football and rugby league.

Design: Cross-sectional survey.

Method: The survey, based on an extended theory of planned behaviour model, was completed by 183 Australian football coaches, 121 Australian football sports trainers, 171 rugby league coaches, and 142 rugby league sports trainers.

Results: Personal norms and self-efficacy were significant predictors of intention to use concussion guidelines, although the relationship between self-efficacy and intention norms was stronger among Australian football coaches than rugby league coaches. Analysis of the salient beliefs that underpin self-efficacy also revealed that coaches, irrespective of football code, felt less familiar ($\chi^2=25.70$, $p<0.001$) and experienced ($\chi^2=31.56$, $p<0.001$) than sports trainer in using the concussion guidelines. At the same time, Australian football personnel, irrespective of their team role, felt that they had insufficient time ($\chi^2=8.04$, $p<0.01$) and resources ($\chi^2=12.31$, $p<0.001$) to implement the concussion guidelines relative to rugby league personnel.

Conclusions: Social marketing campaigns aimed at increasing the intended use of sport concussion guidelines should focus on enhancing self-efficacy and leveraging personal norms. Increasing coaches' familiarity and experiencing in using the concussion guidelines would also be warranted, as would finding ways to overcome the perceived time and resource constraints identified among Australian football personnel.

1 understand the factors that influence coaches and sports trainers' decisions to use these
2 guidelines.

3 The theory of planned behaviour (TPB),⁸ one of the most widely applied models of
4 decision-making in the health⁹ and injury prevention¹⁰ literature, may provide one means for
5 understanding the factors associated with intention to use concussion guidelines. According
6 to the TPB, an intention is determined by three factors: attitude, subjective norm, and
7 perceived behavioural control. Attitude refers to an evaluation of the possible outcomes that
8 could arise if the behaviour was enacted, while subjective norm reflects the behavioural
9 expectations of others. Finally, perceived behavioural control, which is often assessed under
10 the guise of self-efficacy,¹¹ denotes an individual's confidence in their own ability to enact
11 the behaviour being examined. Attitude, subjective norm, and perceived behavioural control
12 are in turn influenced by behavioural, normative, and control beliefs, respectively. These
13 beliefs reflect the views that individuals hold about the behaviour under examination and are
14 integral to explaining why individuals may or may not intend to enact that behaviour.

15 While the TPB typically exhibits good predictive utility across a range of behavioural
16 contexts,¹² a number of extensions have been proposed in an effort to expand the model's
17 predictive power.¹³ One extension that may have relevance to understanding intention to use
18 concussion guidelines is personal norm. Personal norm refers to an individual's values
19 regarding what constitutes appropriate and inappropriate patterns of behaviour as well as any
20 feelings of regret that they may experience should those values be violated.¹¹ Thus, the
21 purpose of this study was to apply an extended TPB model to understand the decision-making
22 processes associated with the intended use of the current AFL/NRL concussion guidelines by
23 coaches and sports trainers affiliated with community-level AF and RL clubs.

24

25

1 **Methods**

2 Ethics approval for this study was obtained from the Monash University Human Research
3 Ethics Committee. Individuals were eligible to participate in the study if they were aged 18+
4 years and were a registered coach or sports trainer at a community-level AF or RL club.
5 Recruitment took place between 9 May 2012 and 31 August 2012. Study recruitment notices
6 for the AF arm of the project were placed in a range of electronic media, including the AFL
7 community website, the website of the Victorian Branch of Sports Medicine Australia, the
8 AFL School Ambassador Program eNewsletter, and the AFL Community Development
9 eNewsletter. Details of the study were also emailed directly to registered AF coaches through
10 the AFL development network and to registered users of Sport Medicine Australia's Sports
11 Injury Tracker, an online sports injury surveillance system. In the RL arm of the project,
12 study recruitment notices were emailed directly to coaches and sports trainers with active
13 accreditation through the LeagueNet database. Details of the study were also included in
14 Sport Medicine Australia's Smartplay eflash, a sport safety and injury prevention program,
15 and sent to registered users of Sport Medicine Australia's Sports Injury Tracker.

16 Published TPB survey construction guidelines¹⁴ were used to develop scales for
17 intention (three items; Cronbach $\alpha = .84$), attitude (nine items; Cronbach $\alpha = .88$), subjective
18 norm (one item), and self-efficacy (three items; Cronbach $\alpha = .88$). The personal norm scale
19 (six items; Cronbach $\alpha = .81$) was constructed following the procedures outlined by Newton
20 et al.¹¹ All TPB items were assessed using items measured on 7-point scales. A copy of the
21 survey items can be found in the online supplementary material.

22

23 Insert Table 1 about here.

24

1 Participants were also presented with seven behavioural, 11 normative, and six
2 control beliefs derived from a review of extant literature. For each set of beliefs, participants
3 were asked to select the three that were most important to them. This process provides a
4 means for identifying the beliefs that are personally salient to each participant.¹⁵⁻¹⁶

5 Analyses were conducted using SPSS version 20.0. Multiple linear regression analysis
6 was used to assess whether the predictive utility of the extended TPB constructs vis-à-vis
7 intention varied with respect to participants' football code and team role. Specifically,
8 intention was regressed against attitude, subjective norm, self-efficacy, personal norm,
9 football code (0 = RL, 1 = AF), team role (0 = sports trainer, 1 = coach), and the second- and
10 third-order interactions associated with football code and team role. Following standard
11 procedures for examining interactions,¹⁷ attitude, subjective norm, self-efficacy, and personal
12 norm were centred prior to being analysed. Statistical probing of significant interactions was
13 conducted using the slope difference test.¹⁸

14 Multiway frequency analysis was used to determine whether the salience of
15 behavioural, normative, and control beliefs differed by football code and team role.
16 Significant second-order effects were probed using chi-square tests of independence.

17

18 **Results**

19 In total, 934 individuals opened the survey link and met the selection criteria. Of these, 617
20 participants completed all TPB construct items and were retained for analysis. These
21 participants comprised 183 AF coaches, 121 AF sports trainers, 171 RL coaches, and 142 RL
22 sports trainers.

23 The multiple linear regression model was significant ($F(19, 597) = 81.45, p < 0.001,$
24 $\text{adj. } R^2 = .65$), with self-efficacy and personal norms having significant main effects on
25 intention (see Table 1). The 2-way interaction between football code and self-efficacy was

1 also a significant predictor of intention, as was the 3-way interaction between football code,
2 team role, and self-efficacy. No other main or interaction effects were significant, including
3 those associated with attitude and subjective norm.

4

5 Insert Table 1 about here.

6

7 The significant 3-way interaction between self-efficacy, football code, and team role
8 was probed using the slope difference test (see Figure 1). Six pair-wise slope comparisons
9 were conducted. Results revealed that the slope between self-efficacy and intention
10 significantly differed between AF coaches and RL coaches ($t = 2.94, p < 0.01$). No other
11 significant slope differences were observed.

12

13 Insert Figure 1 about here.

14

15 While self-efficacy significantly predicted intention, attitude and subjective norm did
16 not. The multiway frequency analysis of the salient beliefs reported in this paper was
17 therefore restricted to control beliefs as these beliefs conceptually underpin self-efficacy and
18 may consequently provide insights into how self-efficacy could be enhanced. The multiway
19 frequency analysis results for behavioural beliefs (which underpin attitude) and normative
20 beliefs (which underpin subjective norm) can be found in the online supplementary material.

21 The multiway frequency analysis revealed significant 2-way interactions for five of
22 the six control beliefs (see Table 2). For example, coaches ($n = 112, 31.6\%$) were more likely
23 than sports trainers ($n = 44, 16.7\%$) to identify “I’m not responsible for using the AFL/NRL
24 concussion guidelines” as a salient belief ($\chi^2 = 17.75, p < 0.001$). Conversely, sports trainers
25 ($n = 64, 24.3\%$) were more likely to nominate “I don’t have the time needed to use the

1 AFL/NRL concussion guidelines” as salient than coaches (n = 54, 15.3%; $\chi^2 = 8.04$, $p < 0.01$).
2 The salience of this belief was also found to vary by football code, with AF personnel (n = 69,
3 22.7%) more likely to nominate it as salient than RL personnel (n = 49, 15.7%; $\chi^2 = 4.95$, $p <$
4 0.05).

5

6 Insert Table 2 about here.

7

8 The notion that “I don’t have the resources needed to use the AFL/NRL concussion
9 guidelines” was more likely to be selected by AF personnel (n = 176, 57.9%) than RL
10 personnel (n = 137, 43.8%; $\chi^2 = 12.31$, $p < 0.001$). Differences were also observed for the
11 belief that “I do not have much experience using the AFL/NRL concussion guidelines”, with
12 coaches (n = 295, 83.3%) more likely than sports trainers (n = 167; 63.5%) to nominate it as
13 being personally salient ($\chi^2 = 31.56$, $p < 0.001$). Finally, coaches (n = 213, 60.2%) were more
14 likely to identify “I am not familiar with the AFL/NRL concussion guidelines” as salient than
15 sports trainers (n = 104, 39.5%; $\chi^2 = 25.70$, $p < 0.001$). However, the significant 2-way
16 interaction between this belief and football code was marginally not-significant when probed
17 using chi square tests of independence ($p = 0.05$)

18

19

Discussion

20 Recent analysis of hospital admissions data suggests that the incidence of sport-related
21 concussion in Australia is rising.¹⁹ This study, the first to our knowledge to examine the
22 decision-making processes associated with intended concussion guideline use among
23 community-level sporting personnel, is therefore of particular importance as it provides key
24 insights for promoting the use of such guidelines among those who play key roles in
25 managing sport-related concussions.

1 Two specific decision-making constructs were identified as having a particular
2 influence on intention to use the AFL/NRL concussion guidelines: personal norms and self-
3 efficacy. That is, coaches and sports trainers were more likely to intend to use concussion
4 guidelines if they linked the use of the guidelines to their personal values about what
5 constitutes appropriate and inappropriate patterns of behaviour (personal norms) and felt
6 confident in their ability to use the guidelines (self-efficacy). As such, social marketing
7 campaigns²⁰ aimed at enhancing personal norms and self-efficacy could increase the intended
8 use of concussion guidelines among AF and RL coaches and sports trainers.

9 One means for enhancing personal norms would be to encourage individuals to
10 anticipate the feelings of regret that could eventuate should they fail to make use of the
11 concussion guidelines. These feelings of regret could stem from considering the legal
12 repercussions associated with mismanaging a player with suspected concussion or from
13 reflecting on the longer-term effects that a mismanaged concussion could have on the health
14 and wellbeing of players. Highlighting these potential sources of regret in social marketing
15 campaigns aimed at increasing the use of concussion guidelines may therefore provide a
16 powerful motivational impetus for using these guidelines. This approach is likely to be
17 equally effective among coaches and sports trainers given that the predictive utility of
18 personal norms did not differ between these two groups.

19 Self-efficacy was also identified as a significant predictor of intention. Unlike
20 personal norms, however, the predictive utility of this construct with respect to intention was
21 found to differ by sporting code and team role. Specifically, the slope between intention and
22 self-efficacy was significantly greater for AF coaches as opposed to RF coaches, suggesting
23 that interventions aimed at increasing self-efficacy to use concussion guidelines will be most
24 effective at increasing the intended use of these guidelines among AF coaches. It should be
25 noted, however, that self-efficacy also had a main effect on intention. Thus, while social

1 marketing interventions that focus on enhancing self-efficacy may be especially effective
2 among AF coaches, they are also likely to be effective among other AF and RL sporting
3 personnel.

4 Several means are available for enhancing self-efficacy. For example, following
5 Bandura²¹, self-efficacy could be bolstered by providing opportunities for coaches and sports
6 trainers to vicariously experience others making use of concussion guidelines. Such vicarious
7 experience could help to convince individuals that making use of concussion guidelines falls
8 within their personal capabilities, especially if observers believed that they were similar to
9 those seen to be implementing the guidelines. Online knowledge-based training programs
10 have also been found to increase coaches' self-efficacy to respond to and manage sport-
11 related concussions.²²

12 Further insights into how self-efficacy could be enhanced were found by analysing the
13 salient control beliefs held by AF and RL coaches and sports trainers. In particular, AF and
14 RL coaches were more likely than their sports trainer counterparts to nominate beliefs that
15 implicated their inexperience and lack of familiarity with using the concussion guidelines as
16 barriers to using these guidelines. These findings point to a need for additional skills training
17 among coaches from both football codes to increase their confidence in using the concussion
18 guidelines. Conversely, AF personnel, irrespective of their team role, were more likely than
19 their RL counterparts to perceive time and resource constraints to using concussion
20 guidelines. Efforts to promote the concussion guidelines among AF personnel should
21 therefore seek to remedy these issues by identifying ways to more effectively integrate the
22 use of these guidelines into their training and match-day activities.

23 As with all research, a number of limitations were associated with the current study.
24 One limitation was that participants were not randomly recruited, limiting the extent to which
25 the results can be generalised to the broader population of AF and RL coaches and sports

1 trainers. Nevertheless, the sample was sufficiently large to minimise the extent of any such
2 biases. A second limitation was that previous exposure to, and use of, the AFL/NRL
3 concussion guidelines was not recorded. As a result, it is unclear whether the decision-
4 making processes associated with using the concussion guidelines may differ as a function of
5 previous guideline use. Future research employing more generalizable recruitment strategies
6 and which records prior use of concussion guidelines is therefore required.

7

8

Conclusion

9 Application of an extended TPB model identified several factors associated with coaches and
10 sports trainers' intended use of the AFL/NRL concussion guidelines, including self-efficacy
11 and personal norm. Moreover, analysis of the salient beliefs held by coaches and sports
12 trainers identified specific issues undermining the use of concussion guidelines, including
13 time and resource constraints and perceived inexperience and unfamiliarity in using the
14 guidelines. These findings provide useful insights for the development of social marketing
15 interventions aimed at encouraging the use of the AFL/NRL concussion guidelines among
16 these cohorts.

17

18

Practical implications

- 19 • Social marketing campaigns aimed at increasing the intended use of concussion
20 guideline use should focus on enhancing personal norms and self-efficacy.
- 21 • Campaigns targeting self-efficacy may be particularly effective for Australian football
22 coaches relative to rugby league coaches.
- 23 • Coaches, irrespective of football code, felt less familiar and experienced in using
24 concussion guidelines than sports trainers.

- 1 • Australian football personnel, irrespective of their team role, perceived greater time
2 and resource constraints in using concussion guidelines than their rugby league
3 counterparts.

4

5

Acknowledgements

6 This study was funded by a Victorian Sports Injury Prevention Research Grant through the
7 Department of Planning and Community Development Sport and Recreation Victoria. PEW's
8 salary was paid from this grant. CFF was supported by an NHMRC Principal Research
9 Fellowship (ID: 565900).

10

References

- 1
- 2 1. Alla S, Sullivan SJ, McCrory P et al. Spreading the word on sports concussion:
- 3 Citation analysis of summary and agreement, position and consensus statements on
- 4 sports concussion. *Br J Sports Med* 2011; 45:132-135.
- 5 2. McCrory P, Meeuwisse W, Johnston K et al. Consensus statement on concussion in
- 6 sport 3rd international conference on concussion in sport held in Zurich, November
- 7 2008. *Clin J Sport Med* 2009; 19:185-200.
- 8 3. AFL Medical Officers Association. The management of concussion in Australian
- 9 football. Available at:
- 10 [http://mm.afl.com.au/portals/0/afl_docs/development/coaching/afl_concussion_mana](http://mm.afl.com.au/portals/0/afl_docs/development/coaching/afl_concussion_management_booklet.pdf)
- 11 [gement_booklet.pdf](http://mm.afl.com.au/portals/0/afl_docs/development/coaching/afl_concussion_management_booklet.pdf) Accessed 8 January 2013.
- 12 4. National Rugby League. Management of concussion in rugby league. Available at:
- 13 [http://www.nrl.com/About/ReferenceCentre/ManagementofConcussioninRugbyLeagu](http://www.nrl.com/About/ReferenceCentre/ManagementofConcussioninRugbyLeague/tabid/10798/Default.aspx)
- 14 [e/tabid/10798/Default.aspx](http://www.nrl.com/About/ReferenceCentre/ManagementofConcussioninRugbyLeague/tabid/10798/Default.aspx) Accessed 8 January 2013.
- 15 5. Hollis SJ, Stevenson MR, McIntosh AS et al. Compliance with return-to-play
- 16 regulations following concussion in Australian schoolboy and community rugby
- 17 union players. *Br J Sports Med* 2012; 46:735-740.
- 18 6. Donaldson A, Finch CF. Identifying context-specific competencies required by
- 19 community-level Australian Football sports trainers. *Br J Sports Med* 2012; 46:759-
- 20 766.
- 21 7. Finch CF, Donaldson A. A sports setting matrix for understanding the implementation
- 22 context for community sport. *Br J Sports Med* 2010; 44:973-978.
- 23 8. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;
- 24 50:179-211.
- 25 9. Painter JE, Borba CPC, Hynes M et al. The use of theory in health behavior research
- 26 from 2000 to 2005: A systematic review. *Ann Behav Med* 2008; 35:358-362.
- 27 10. McGlashan AJ, Finch CF. The extent to which behavioural and social science theories
- 28 and models are used in sport injury prevention research. *Sports Med* 2010; 40:841-
- 29 858.
- 30 11. Newton JD, Newton FJ, Ewing MT et al. Conceptual overlap between moral norms
- 31 and anticipated regret in the prediction of intention: Implications for the theory of
- 32 planned behaviour. *Psychol Health* 2013; 28:495-513.
- 33 12. Armitage CJ, Conner M. Efficacy of the theory of planned behaviour: A meta-analytic
- 34 review. *Br J Social Psychol* 2001; 40:471-499.
- 35 13. Conner M, Armitage CJ. Extending the theory of planned behavior: A review and
- 36 avenues for future research. *J Appl Soc Psychol* 1998; 28:1429-1464.
- 37 14. Fishbein M, Ajzen I. *Predicting and changing behavior: The reasoned action*
- 38 *approach*, New York, Psychology Press, 2010.
- 39 15. Newton JD, Ewing MT, Burney S et al. Resolving the theory of planned behaviour's
- 40 'expectancy-value muddle' using dimensional salience. *Psychol Health* 2012; 27:588-
- 41 602.
- 42 16. van der Pligt J, De Vries NK. Belief importance in expectancy-value models of
- 43 attitudes. *J Appl Soc Psychol* 1998; 28:1339-1354.
- 44 17. Aiken LS, West SG. *Multiple regression: Testing and interpreting interactions*,
- 45 Newbury Park, Sage Publications, 1991.
- 46 18. Dawson JF, Richter AW. Probing three-way interactions in moderated multiple
- 47 regression: Development and application of a slope difference test. *J Appl Psychol*
- 48 2006; 91:917-926.
- 49 19. Finch CF, Clapperton AJ, McCrory P. Increasing incidence of hospitalisation for
- 50 sport-related concussion in Victoria, Australia. *Med J Aust* 2013; 198:427-430.

- 1 20. Newton JD, Ewing ME, Finch CF. Social marketing: Why injury prevention needs to
2 adopt this behaviour change approach. *Br J Sports Med* doi:10.1136/bjsports-2011-
3 090567.
- 4 21. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol*
5 *Rev* 1977; 84:191-215.
- 6 22. Glang A, Koester MC, Beaver S et al. Online training in sports concussion for youth
7 sports coaches. *Int J Sports Sci Coach* 2010; 5:1-11.
- 8

1 **Table 1**
 2 Multiple linear regression analysis of the extended theory of planned behaviour model.
 3

Variable	<i>B</i>	<i>SE(B)</i>	β
Football code	-.17	.15	-.04
Team role	-.25	.13	-.06
Attitude	.02	.01	.08
Subjective norm	.07	.07	.06
Self-efficacy	.06	.03	.08*
Personal norm	.27	.04	.54***
Football code x Team role	.34	.20	.08
Football code x Attitude	.00	.02	.01
Football code x Subjective norm	.01	.10	.01
Football code x Self-efficacy	.20	.06	.19*
Football code x Personal norm	-.01	.05	-.01
Team role x Attitude	-.01	.02	-.01
Team role x Subjective norm	.14	.09	.10
Team role x Self-efficacy	.09	.05	.09
Team role x Personal norm	.03	.05	.05
Football code x Team role x Attitude	-.01	.03	-.02
Football code x Team role x Subjective norm	-.15	.14	-.07
Football code x Team role x Self-efficacy	-.23	.09	-.16*
Football code x Team role x Personal norm	.02	.07	.02

4 * $p < 0.05$; *** $p < 0.001$

5 Football code: 0 = RL, 1 = AF

6 Team role: 0 = sports trainer, 1 = coach

7

1 **Table 2**
 2 Multiway frequency analysis second order effects for salient control beliefs.
 3

Variable	Partial χ^2	Difference
Belief 1: I'm not responsible for using the AFL/NRL concussion guidelines		
Belief 1 x Football code	0.03	
Belief 1 x Team role	18.21 ^{***}	Coach > trainer
Football code x Team role	1.82	
Belief 2: I don't have the time needed to use the AFL/NRL concussion guidelines		
Belief 2 x Football code	5.80 [*]	AF > RL
Belief 2 x Team role	8.80 ^{**}	Trainer > coach
Football code x Team role	2.79	
Belief 3: I don't have the resources needed to use the AFL/NRL concussion guidelines		
Belief 3 x Football code	12.30 ^{***}	AF > RL
Belief 3 x Team role	0.00	
Football code x Team role	1.90	
Belief 4: I find the AFL/NRL concussion guidelines unclear and difficult to follow		
Belief 4 x Football code	0.79	
Belief 4 x Team role	0.01	
Football code x Team role	1.94	
Belief 5: I do not have much experience using the AFL/NRL concussion guidelines		
Belief 5 x Football code	0.49	
Belief 5 x Team role	30.88 ^{***}	Coach > trainer
Football code x Team role	1.45	
Belief 6: I am not familiar with the AFL/NRL concussion guidelines		
Belief 6 x Football code	5.31 [*]	
Belief 6 x Team role	27.32 ^{***}	Coach > trainer
Football code x Team role	3.41	

4 * $p < 0.05$; ** $p < .01$; *** $p < 0.001$

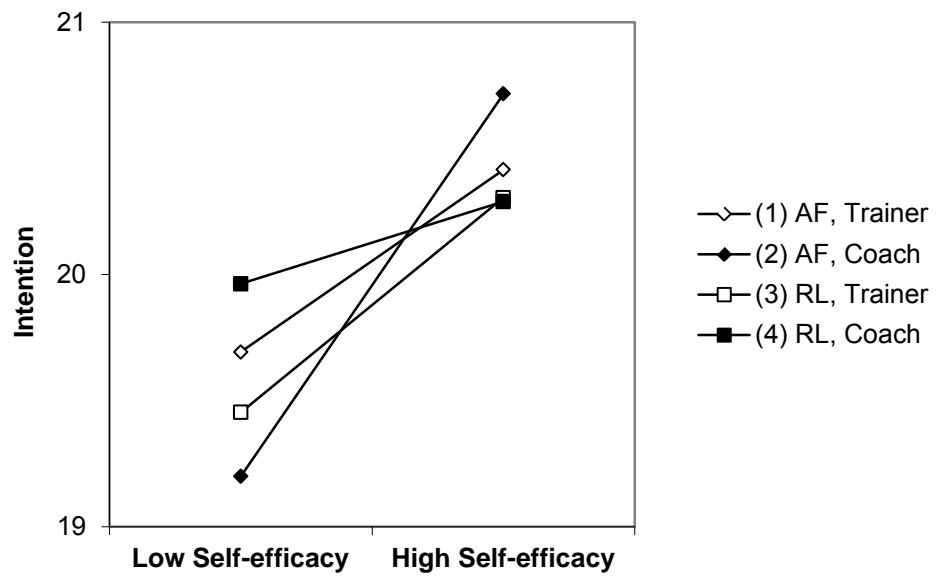


Figure 1
The relationship between self-efficacy and intention by football code and team role.